

Beazer

BEAZER EAST, INC., 436 SEVENTH AVENUE, PITTSBURGH, PA 15219

30 August 1995

Ms. Lisa Marino
U.S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19107-4431

Subject: Request to Perform the Public Health and Ecological Assessments
Administrative Order on Consent (Docket No. III-91-16-DC)
Former Koppers Company, Inc. Site
Newport, Delaware

Dear Lisa:

On behalf of Beazer East, Inc. (Beazer) and E.I. duPont de Nemours and Company, Inc. (DuPont), this letter requests permission to perform the Public Health and Ecological Assessments for the Former Koppers Company, Inc., Newport, Delaware, Site (Site) pursuant to OSWER Directive No. 9835.15b, New Policy on Performance of Risk Assessments During Remedial Investigation/Feasibility Studies (RI/FS) Conducted by Potentially Responsible Parties (PRPs) (OSWER Directive).

According to the Administrative Order on Consent for the Site entered into by EPA, Beazer, and DuPont, EPA will prepare the Risk Assessment for the Site. However, the OSWER Directive announced EPA's new policy on conducting risk assessments at Superfund sites where PRPs are conducting the RI/FS. In appropriate cases, risk assessments (ecological and public health) can be conducted by PRPs under oversight by EPA. According to the OSWER Directive, EPA's determination to allow a PRP to conduct the risk assessment will be based on site-specific considerations including the following criteria:

- EPA's prior experience with the requesting PRPs at this or other sites;
- PRP or PRP contractor's experience in conducting Superfund risk assessments;
- PRP or PRP contractor's knowledge of current Superfund risk assessment processes and guidance documents;
- PRP or PRP contractor's ability to submit data to EPA in the proper format; and
- Available EPA resources and schedule for RI/FS completion.

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The first criterion pertains to EPA's experience with the PRPs. Beazer and DuPont have extensive corporate experience conducting Superfund risk assessments nationwide as well as in EPA Region III. Information on these risk assessments can be provided upon request. Beazer and DuPont employ qualified professionals in the environmental and risk assessment fields, and the companies also contract with qualified consultants. DuPont, as a company that provides environmental and remediation services, has performed numerous ecological and public health risk assessments. Mr. Joel Karmazyn, of DuPont, has extensive Superfund experience, including risk assessments, on sites throughout the country as well as in Region III. As for myself, I have both academic and consulting experience in the risk assessment field including the preparation of risk assessments as an EPA contractor under the REM III and ARCS contracts. We feel that we have developed a good, cooperative working relationship with you and state representatives on this project, one that has developed from mutual respect. Furthermore, significant improvements in communication have occurred over the past several years and we expect it to continue.

The criteria outlined above in the second through fourth bullets pertain to the consultant who will be performing the risk assessment. Beazer and DuPont propose that Environmental Standards, Inc. (ESI) of Valley Forge, Pennsylvania perform the public health portion of the Risk Assessment. ESI has extensive experience conducting Superfund risk assessments and knowledge about the current Superfund risk assessment process. ESI performed one of the first risk assessments according to the updated Risk Assessment Guidance for Superfund (RAGS) (EPA, 1989). Dr. Kenneth Symms will manage the Public Health Assessment for ESI. Dr. Symms has directed over 500 formally written, peer-reviewed toxicological evaluations of hazardous waste sites, including Public Health Risk Assessments for RI/FS and RCRA projects in EPA Region III. Attachment 1 contains a Statement of Qualifications (SOQ) describing ESI's qualifications and experience.

Beazer and DuPont propose that Woodward Clyde Consultants' (WCC) Plymouth Meeting, Pennsylvania office perform the ecological portion of the Risk Assessment. WCC has over 10 years of experience performing ecological risk assessments and the Plymouth Meeting office is a recognized leader for ecological risk assessments. WCC is currently working with EPA Headquarters using the 1994 draft Ecological Risk Assessment Guidance for Superfund (EPA, 1994) on a Gulf Coast site as a test case. As you know, WCC has been conducting the RI at the Site. As such, WCC staff are extremely knowledgeable about Site conditions. WCC's key ecological risk assessment professionals will be Ms. Ceil Mancini, Mr. Edward Odenkirchen, and Ms. Laurel Pye. Ms. Mancini has been working on this project for the last few years including planning the Phase I RI, implementing the field work, evaluating the Phase I data, and preparing the Phase II RI scope of work. Ms. Mancini is a Certified

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Senior Ecologist by the Ecological Society of America. Mr. Odenkirchen and Ms. Pye also have extensive ecological risk assessment experience. Mr. Odenkirchen has performed ecological risk assessments on Superfund sites and has provided technical expertise on ecological issues to various EPA offices. Ms. Pye, as a terrestrial ecotoxicologist, has assessed adverse effects from contaminant releases on terrestrial wildlife and ecosystems. Attachment 2 is an SOQ for WCC that describes WCC's experience and approach to conducting the ecological assessment.

As you will note from reading ESI's and WCC's Statements of Qualifications, interim documents are proposed to be submitted to EPA or meetings are proposed to be conducted with EPA to exchange information throughout the process. This approach will ensure that procedures are agreed to early in the process, the risk assessments are performed in a timely manner, the final report is in the form desired by EPA, and that minimal revisions will be required. Beazer and DuPont sincerely appreciate EPA's consideration of this request to perform the Risk Assessment. We are confident that we have the commitment, technical capability, and the resources necessary to conduct the Risk Assessment in an efficient manner. We continue to look forward to working with EPA to complete the RI/FS in a cooperative manner and trust the EPA will seriously consider this request.

If you have any questions or need additional information, please do not hesitate to call.

Sincerely,

Jane Patarcity

Jane M. Patarcity
Program Manager

sqc

Enclosure

cc: Margie Zhang, DNREC (2 copies)
Joel Karmazyn, DuPont Environmental Services
Ken Symms, Environmental Standards
Jim Buczala, Woodward Clyde Consultants
Ceil Mancini, Woodward Clyde Consultants
Susan Colman, Geomatrix Consultants



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Environmental Solutions

ATTACHMENT 1

ENVIRONMENTAL STANDARDS, INC.'S

STATEMENT OF QUALIFICATIONS

FOR THE

HUMAN HEALTH RISK ASSESSMENT

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AR309000

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Table 1

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1.0 INTRODUCTION

The Environmental Protection Agency (EPA), as stated in the OSWER Directive, determines whether a potentially responsible party (PRP) is capable of performing the risk assessment component of the Remedial Investigation (RI) and Feasibility Study (FS) on a site-specific basis. One criterion to be considered by EPA is the qualifications of the risk assessment consultant. Environmental Standards, Inc. (Environmental Standards) has considerable experience in conducting Superfund risk assessments, knowledge of current Superfund risk assessment processes and guidance documents, and the ability to submit data to EPA in the proper format. Information is provided in this attachment to illustrate our capability to perform the Human Health Risk Assessment (HHRA) for the Former Koppers Company Inc., Newport Site (Site).

2.0 ENVIRONMENTAL STANDARDS EXPERIENCE IN CONDUCTING SUPERFUND RISK ASSESSMENTS

Environmental Standards has gained a reputation for excellence in the performance of human health risk assessments for federal and state regulatory agency-driven investigations nationwide. One critical factor in allowing PRPs to conduct risk assessments is EPA's past experience with the PRP's contractor. The Environmental Standards risk assessment group has conducted numerous baseline risk assessments for Superfund sites. For example, one of the first, if not the first, risk assessments performed according to the updated guidelines, *Risk Assessment Guidance for Superfund* (RAGS) which was published in December, 1989, was undertaken by Environmental Standards for the Delta Quarries site near Altoona, PA. Ms. Nancy Rios served as the EPA reviewer for that report. Environmental Standards is currently working with Ms. Melissa Whittington in EPA Region III on a Superfund site in West Virginia. Environmental Standards specializes in risk assessment, toxicology, data validation, and fate and transport modeling. These disciplines have been the focus of the company's consulting services



since its inception in 1987. Table 1 summarizes some of the risk assessments performed by Environmental Standards for Superfund sites.

2.1 Project Team

A brief description of the proposed project team is presented below. Professional Profiles for the proposed risk assessment team are presented in Appendix A.

Kenneth G. Symms, Ph.D., DABT will oversee the development of the risk assessment, provide technical lead, and conduct agency interactions, as needed, for this project. His background makes him uniquely suited for these tasks, which includes direction of over 500 formally written, peer-reviewed toxicological evaluations of hazardous waste sites, including human health and environmental risk assessments for RI/FS and RCRA projects in EPA Region III. Dr. Symms has developed and defended acceptable levels of exposure for numerous chemical substances not characterized by EPA and for which no exposure guidelines exist.

Dr. Symms is very familiar with EPA personnel in Region III who are responsible for reviewing risk assessments. Dr. Symms worked closely with Dr. Dick Brunker, Dawn Iovan, and others in the program. In addition, Dr. Symms was given the responsibility of performing the first Superfund risk assessment under CERCLA Enforcement in Region III (viz., Industrial Lane, Easton, PA).

Specifically, Dr. Symms' applicable project experience includes the recent performance of a baseline risk assessment for a large RCRA Facility Investigation. The report was accepted by Region III without any need for modification (report reviewed by Youngmoo Kim). Dr. Symms also has conducted numerous risk assessments in USEPA Regions II, III, V, and VII.

Dr. Symms has provided toxicological expertise and communication of hazard perspective to concerned citizens at public meetings. As Director of Toxicology and Risk Assessment Services



at Environmental Standards, he provides highly specialized expertise in the performance of risk assessments. Dr. Symms has developed an intimate familiarity with federal and state regulations and technical guidance, including Region III guidance.

Jennifer C. Kotanchik, B.A. has been with Environmental Standards for over three years and has experience in human health and environmental risk assessment. Her areas of expertise include developing health-based cleanup and performance goals, conducting quantitative human health risk assessment, developing reasonable exposure scenarios, performing fate-and-transport modelling, and developing acceptable exposure levels for various chemicals which have no EPA-derived toxicity values or criteria.

Ms. Kotanchik has assisted in the development of the first successful Type C (site-specific, risk-based) cleanup goals for an active property listed by Michigan Department of Natural Resources (MDNR). The assessment was accepted and highly praised by MDNR. She has also performed baseline risk assessments of potential risks to human health and the environment associated with exposures to a tetrachloroethylene spill from a dry cleaning facility in the State of New York and with exposures associated with the proposed use of a building located on fill material in the State of Ohio. Ms. Kotanchik received her B.A. degree in Biology from Brown University in 1991.

Kristin G. Lawrence, B.S. joined Environmental Standards in August 1992. Her areas of expertise include risk assessment and development of remediation goals for both human and ecological receptors. She has developed remedial goals for soil, sediment, surface water, and groundwater and worked with an extremely diverse assortment of site environments in locations in Hawaii, Arizona, Connecticut, New York, Florida, and Missouri.

Ms. Lawrence received her B.S. degree in Marine and Freshwater Biology from the University of New Hampshire in 1992.



3.0 HUMAN HEALTH RISK ASSESSMENT APPROACH

3.1 Knowledge of Superfund Risk Assessment Processes and Guidance Documents
Environmental Standards has a thorough knowledge of federal and Region III EPA human health risk assessment guidelines. The following EPA guidance documents will be utilized throughout the HHRA:

- *CERCLA Compliance with Other Laws Manual* (U.S. EPA, 1988a);
- *EPA National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Under The Comprehensive Environmental Response, Compensation And Liability Act of 1980* (U.S. EPA, 1993);
- *Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual/ Part A (RAGS/Part A)* (U.S. EPA, 1989a);
- *Risk Assessment Guidance for Superfund, Human Health Evaluation Manual/ Part B, Development of Risk-based Preliminary Remediation Goals (RAGS/Part B)* (U.S. EPA, 1991);
- *Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors"* (U.S. EPA, 1991a);
- *Exposure Factors Handbook* (U.S. EPA, 1989b);
- *Guidelines for Exposure Assessment* (U.S. EPA 1992a);
- *Dermal Exposure Assessment: Principles and Applications* (U.S. EPA, 1992b);
- *Guidance for Data Useability in Risk Assessment (Part A)* (U.S. EPA, 1992c);
- *Supplemental Guidance to RAGS: Calculating the Concentration Term* (U.S. EPA, 1992d);
- *EPA Region III's Technical Guidance Manual, Chemical Concentration Data Near the Detection Limit* (U.S. EPA, 1991b);
- *EPA Region III's Technical Guidance Manual, Exposure Point Concentrations In Groundwater* (U.S. EPA, 1991c);



- EPA Region III's *Technical Guidance Manual; Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening* (U.S. EPA, 1993);
- EPA Region III's *Technical Guidance Manual; Use of Monte Carlo Simulation in Risk Assessments* (U.S. EPA, 1994b); and
- EPA Region III's *Risk-Based Concentration Table* (U.S. EPA, 1995).

3.2 Human Health Risk Assessment Process

Beazer and DuPont are sensitive to the fact that EPA desires to minimize all potential delays and to submit findings and reports in a timely manner. To this end, Environmental Standards proposes to have interim meetings with the Region III Regional Project Manager (RPM) and/or provide submissions to facilitate discussion of potential human health risk assessment issues and to minimize delays.

The first proposed point for an interim meeting or submission for Phase 1 of the risk assessment is a list of constituents of potential concern presented with the rationale for the screening method. An interim meeting or submission for Phase 2 would be a list of exposure pathways to be quantitatively assessed. Phase 3's interim meeting or submission would be a table of toxicity values for constituents of potential concern. The HHRA approach is discussed below:

Phase 1: Data evaluation - This phase will include the process of statistically analyzing on-Site and background data relevant to potential human health impacts for the media of concern, and selecting the constituents of potential concern through screening procedures. The methodology, rationale, and results of the identification of constituents of potential concern will be presented to the RPM for discuss in a meeting or as an interim submission, to expedite the HHRA development.

Phase 2: Exposure assessment - This assessment will identify the relevant exposure pathways and populations at potential risk under current and future scenarios,

estimate exposure point concentrations for relevant media, and calculate average daily intakes (noncarcinogenic) and average lifetime daily intakes (carcinogenic) for the populations of potential concern. At this point, a summary of the Site-specific exposure pathways, exposed populations, and exposure assumptions will be presented to the RPM in a meeting or as an interim submission.

Phase 3: Toxicity assessment - This assessment will determine chemical dose-response relationships and daily intake levels at which no adverse effects or unacceptable cancer risks can reasonably be anticipated to result. Toxicity indices for constituents of potential concern, including those for which published information (via EPA's IRIS and HEAST) is not available, will be determined. The toxicity indices for constituents lacking EPA-published values will be termed "provisional," and supporting documentation for review will be provided. This section of the report will discuss the sources of toxicity information, the use of provisionally derived values, and the uncertainty spanning the use of these benchmarks. A table summarizing the relevant toxicity benchmarks (viz., RfDs, CSFs) for the constituents of potential concern will be presented to the EPA in a meeting or as another interim submission. If any constituents of potential concern lack published RfD values, provisional values will be developed and supporting documentation provided to EPA.

Phase 4: Risk characterization - This phase will compare estimated daily chemical intake levels with toxicity indices (acceptable daily intake levels) to generate quantitative expressions of hazard (for noncarcinogens) and the upper limits of probability of causing cancer (for carcinogens) for exposure scenarios of concern. An uncertainty analysis will also be performed. A draft, baseline human health risk assessment report will be presented to the RPM at the completion of this final phase.



TABLE 1

**RELEVANT HUMAN HEALTH RISK ASSESSMENT
PROJECT EXPERIENCE SUMMARY
ENVIRONMENTAL STANDARDS, INC.**

Site Description	State	Human Health Risk Assessment	RCRA Risk Assessment	CERCLA Risk Assessment	EPA Region
1. Municipal Landfill	NH	X		X	I
2. Jet Aircraft Engines Manufacturing Plant	CT	X	X		I
3. Sewage Treatment Plant & Municipal Landfills	NY	X		X	II
4. Volatile Organic Compounds Contamination in Groundwater	NJ	X		X	II
5. Municipal Landfill	PA	X		X	III
6. Rare Metals Recycling Plant	PA	X		X	III
7. Ordnance Production Facility	WV	X		X	III
8. Septic Waste & Chemical Waste Disposal Site	PA	X		X	III
9. Pharmaceutical Manufacturing Facility	PA	X	X		III
10. U.S. Air Force Base	AZ	X			IX
11. Lead Recycling Facility	OH	X		X	V
12. Computer Manufacturing Facility	MI	X			V
13. Rubber Manufacturing Facility	OH	X			V
14. Refinery Sludge Disposal Site	OK	X		X	VI
15. Automotive Parts Manufacturing Facility	MO	X			VII
16. Secondary Lead Smelter & Battery Recycling Facility	OR	X		X	X

AR309008



APPENDIX

AR309009



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Environmental Solutions

KENNETH G. SYMMS, Ph.D., DABT

Director of Risk Assessment

FIELDS OF COMPETENCE

- Development of defensible, health-based cleanup goals.
- Quantitative risk assessment.
- Development of acceptable exposure levels for various chemicals which have no EPA-derived guidelines or criteria.
- Expert testimony relating to toxicology, risk assessment, and product liability.
- Sampling strategy for cost-effective and defensible risk characterization.
- Development of exposure scenarios, fate and transport modeling, Monte Carlo simulation analysis.
- Communication of risk perspective: effective translation of hazard into non-technical terms.
- Knowledgeable in environmental chemodynamics and biological toxicokinetics of various chemical agents.

CREDENTIALS

B.A., Chemistry, University of Washington, 1969.

Ph.D., Pharmacology/Toxicology, University of Washington, School of Medicine, 1979.

Certified as a Diplomate of the American Board of Toxicology (1987).

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PROFESSIONAL AFFILIATIONS

American College of Toxicology
International Society for Environmental Toxicology and Cancer
Society for Risk Analysis
Associate of the Environmental Law Institute
American Chemical Society (Chemical Health and Safety Division)
National Environmental Health Association

SUMMARY OF EXPERIENCE

- 15 years experience in environmental toxicology.
- Developed guidelines for indicator chemical selection, exposure coefficients, and evaluating tentatively identified compounds of potential concern.
- Formerly, as senior staff toxicologist for EPA's prime national contractor, developed essential format and structure of public health risk assessments under the hazardous waste site investigation program.
- Provided formal public health risk assessments for RI/FS and RCRA projects in accordance with all guidelines.
- Provided over 500 formally written, peer-reviewed toxicological evaluations of hazardous waste sites.
- Developed and defended acceptable levels of exposure for numerous chemical substances not characterized by the EPA and for which no exposure guidelines exist.
- Provided toxicological expertise and communication of hazard perspective on behalf of regulatory agencies to concerned citizens at public meetings.
- Developed models for risk analysis of dermal, inhalation, and ingestion routes of exposure for children living near areas of surface contamination.
- Post-doctoral experience included rodent bioassay for carcinogens, DNA repair and mutagenicity assays, development of analytical techniques for determination of metabolites and characterization of mechanisms of bioactivation of carcinogens.

AR309011



KEY PROJECTS

- Performed a baseline risk assessment for a large RCRA Facility Investigation where Dense Nonaqueous Liquid Phase (DNAPL) was present in the underlying ground water.
- Developed the first successful Type C (site-specific, risk-based) cleanup goals for an active property listed by the Michigan Department of Natural Resources. The assessment was accepted by MDNR.
- Recommended by EPA to Virginia Department of Health to provide rapid assessment of health hazard posed by the accidental application of 2,4-D instead of floor wax in an elementary school.
- Critically reviewed baseline risk assessment and Feasibility Study for an active junkyard listed on the NPL.
- Developed defensible provisional toxicity benchmarks (*i.e.*, acceptable exposure levels) for rare and exotic metals (*e.g.*, indium, niobium, gallium, *etc.*) at a metals-recycling facility listed on the NPL.
- Served as expert toxicological spokesperson on behalf of owners to address concerns of parents who had been informed that their childrens' day care water supply was contaminated with trichloroethylene (Group B2 carcinogen). The parents applauded at the conclusion of the meeting at the day care center.
- Developed health-based cleanup goals for a large parcel with significant soil contamination from leaking petroleum USTs.
- Researched and developed a sampling strategy and recommended use of a simple non-invasive *in vivo* technique (neutron activation analysis) for determining actual body burdens of cadmium for residents surrounding a zinc smelter. Included application of a simple urinary test to evaluate latent kidney damage in residents living near the zinc smelter.
- Developed and presented a model to more accurately quantify inhalation exposure incurred by bathing or showering with household water contaminated with volatile organic chemicals. Position paper was requested by the ATSDR (Centers for Disease Control).



KEY PROJECTS (Cont.)

- Provided input into developing a corporate health and safety program for hazardous waste workers.
- Designed and conducted a 2-year rodent bioassay to determine carcinogenic activity of chemicals.

PUBLICATIONS

D.H. Wardrop, R.L. Liebowitz, K.G. Symms and D.J. Rosenbaum. Evaluation of risk posed by implementation of remedial options; methodology and utility. Presented at the annual meeting of the Society for Risk Analysis, December 8-11, 1991, Baltimore, MD.

D.J. Rosenbaum, D.H. Wardrop, K.G. Symms and I.J. Zanikos. Utility of risk assessment in evaluating remedial options on a site-specific basis. Toxicologist, Vol. 11, No. 1, 1991.

D.H. Wardrop and K.G. Symms. The cost of worst case. Presented at the meeting of the Society for Risk Analysis, December 6-9, 1992, San Diego, CA.

K.G. Symms, L.J. Long, J.C. Kotanchik and K.G. Lawrence. Sick house syndrome - where air pollutants come from and what hazards and cancer risks the pollutants pose. Presented at the meeting of the Society for Risk Analysis, December 6-9, 1992, San Diego, CA.

K.G. Lawrence, D.H. Wardrop, K.G. Symms, J.C. Kotanchik and L.J. Long. The crack factor. Presented at the meeting of the Society for Risk Analysis, December 5-8, 1993, Savannah, GA.

D.H. Wardrop and K.G. Symms. The cost of conservative risk assessment in remedial decision-making. Presented at the meeting of the Society for Risk Analysis, December 5-8, 1993, Savannah, GA.

K.G. Symms, L.J. Long, S. Symms, D.H. Wardrop, D.C. Nuber, K.G. Lawrence and J.C. Kotanchik. The industrial source complex - long term 2 air dispersion computer model - the big black box. Presented at the meeting of the Society for Risk Analysis, December 5-8, 1993, Savannah, GA.

J.C. Kotanchik, K.G. Symms, L.J. Long and K.G. Lawrence. A utility trench worker exposure scenario for use in developing health and safety plans. Presented at the meeting of the Society for Risk Analysis, December 5-8, 1993, Savannah, GA.

AR309013





Setting the Standards for Innovative
Environmental Solutions

JENNIFER C. KOTANCHIK

Biologist/Risk Assessor

FIELDS OF COMPETENCE

- Development of health-based cleanup performance goals
- Quantitative human health risk assessment
- Development of exposure scenarios, fate and transport modeling
- Development of acceptable exposure levels for various chemicals which have no EPA-derived guidance or criteria
- Familiar with Monte Carlo Simulation Techniques

CREDENTIALS

B.A. Degree in Biology, Brown University, 1991.

3 Years experience in human health and environmental risk assessment.

KEY PROJECTS

- Assisted in the development of the first successful Type C (site-specific, risk-based) cleanup goals for an active property listed by Michigan Department of Natural Resources. The assessment was accepted by MDNR.
- Performed a baseline risk assessment on potential risks to human health and the environment associated with exposures to a tetrachloroethylene spill from a dry cleaning facility in New York State.

RESEARCH

Internship analyzing the life history of *misumena vatia* (crab spiders) on *Asclepias syriaca* (milkweed), and effects of self versus cross pollination of *Asclepias syriaca*.

Independent Study on *Cyphoma gibbosum's* (flamingo tongue snail) substrate preference in relation to soft coral diversity.

Independent Study on Barnacles. Researched the recruitment, settlement, zonation, feeding and growth rate of *Balanus balanoides* and *Semibalanus balanoides*.

PUBLICATIONS

K.G. Symms, L.J. Long, J.C. Kotanchik and K.G. Lawrence. "Sick House Syndrome - Where Air Pollutants Come From and What Hazards and Cancer Risks the Pollutants Pose." Presented at the meeting of the Society for Risk Analysis, December 6-9, 1992, San Diego, CA.

J.C. Kotanchik, K.G. Symms, L.J. Long and K.G. Lawrence. "A Utility Trench Worker Exposure Scenario for Use in Developing Health and Safety Plans." Presented at the meeting of the Society for Risk Analysis, December 5-8, 1993, Savannah, GA.

K.G. Lawrence, D.H. Wardrop, K.G. Symms, J.C. Kotanchik and L.J. Long. "The Crack Factor." Presented at the meeting of the Society for Risk Analysis, December 5-8, 1993, Savannah, GA.

K.G. Symms, L.J. Long, S. Symms, D.H. Wardrop, D.C. Nuber, K.G. Lawrence and J.C. Kotanchik. "The Industrial Source Complex - Long Term 2 Air Dispersion Computer Model - The Big Black Box." Presented at the meeting of the Society for Risk Analysis, December 5-8, 1993, Savannah, GA.



ATTACHMENT 2

**WOODWARD-CLYDE CONSULTANTS
STATEMENT OF QUALIFICATIONS
FOR THE
ECOLOGICAL RISK ASSESSMENT**

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 EXPERIENCE SUMMARY**

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APPENDIX B RESUMES

This attachment describes Woodward-Clyde Consultants' (WCC) firm-wide capabilities and qualifications, the experience of the proposed project team, and the proposed technical approach to perform the Ecological Risk Assessment (ERA) for the Former Koppers Company Inc., Newport Site (Site). The ERA would be performed in our Philadelphia, Pennsylvania office. The Philadelphia office is recognized company-wide as a center of excellence for ecological risk assessment.

**EXPERIENCE OF WOODWARD-CLYDE CONSULTANTS
IN CONDUCTING SUPERFUND ECOLOGICAL RISK ASSESSMENTS**

WCC's qualifications to perform the ERA for the Former Koppers Company Site is built on a foundation of more than a decade of ERA experience, and our experience in related projects and precursors to ERA prior to the mid-1980's. Table 1 summarizes the relevant ERA experience of the proposed project team. Several selected project abstracts have been included in Appendix A. Additional information on these projects or the other ERAs which have been performed by WCC can be provided upon request.

OSWER Directive No. 9835.15b defines specific criteria that are evaluated in EPA's determination on whether to allow a Potentially Responsible Party (PRP) to conduct a risk assessment. Several of these considerations require evaluation of a proposed contractor's qualifications. The following sections respond to these considerations describing WCC's qualifications to perform the ERA for the Site.

2.1 SITE-SPECIFIC CONSIDERATIONS

EPA's Prior Experience with WCC: WCC has frequent project-related interactions with the EPA both on a national and regional (Region III) level. We are accustomed to working closely with the EPA in the development of both work plan and risk assessment documents. WCC is currently working closely with EPA Headquarters using the 1994 draft Ecological Risk Assessment Guidance for Superfund (EPA, 1994) on a Gulf Coast Site as a test case. Most recently (August 1995), WCC was approved by EPA Region VII to perform the ERA for a Site located on the Mississippi river for a confidential client.

The proposed project team has worked with the Region III Biological Technical Assistance Group (BTAG) on previous CERCLA and RCRA projects. In all cases, work was scoped cooperatively and performed to the satisfaction of all involved.

WCC's Experience Conducting Numerous Superfund Risk Assessments: As shown in Table 1, WCC has performed numerous CERCLA risk assessments. In addition, WCC has performed many ERA's using regional or state guidance.

Ability to Submit Data to EPA in the Proper Format: WCC is currently providing data collected as part of the RI of the Site in electronic format to the EPA. This method of data exchange has been adequate and would continue as needed for the ERA.

2.2 PROJECT TEAM

Resumes of key individuals on the project team are presented in Appendix B. Ms. Ceil Mancini will be the Project Manager. She will be assisted by other WCC ecological risk assessors including Mr. Edward Odenkirchen and Ms. Laurel Pye.

Ms. Mancini is an ESA (Ecological Society of America) certified Senior Ecologist with 20 years of experience. She manages all Natural Resource Assessment work in WCC's Philadelphia office including numerous ERA's performed throughout the United States. She is also ERA Practice Leader for WCC's Eastern Operating Group. Ms. Mancini has utilized the most current EPA ERA guidance at several sites, and has a good working relationship with EPA personnel. She has extensive experience in the assessment of aquatic ecological impacts associated with environmental toxins. She has also conducted numerous benthic investigations in freshwater, estuarine and marine ecosystems throughout the United States. Ms. Mancini has managed all of the ecological tasks on the Former Kopper's Company Inc., Newport Site and has been an integral member of the RI/FS project team for the site for the past four years.

Mr. Edward Odenkirchen will provide technical support to the project team in the area of ecotoxicology. Mr. Odenkirchen has more than eight years of experience in the assessment of ecological risks attributable to chemical compounds. He is also ERA Practice Leader for WCC's Eastern Operating Group. He is experienced in the use of wildlife and aquatic toxicity data, chemical analogues, and structure-activity relationships for predicting potential ecological hazards. He has performed ERAs throughout the United States including many ERAs at Superfund sites. His work has included the development of risk based strategies for

establishing sediment removal priorities, food chain transfer of contaminants, assessment of contaminated fisheries, and numerous other contaminant assessments relating to aquatic and wildlife resources.

Ms. Laurel Pye will provide technical support to the project team in ERA strategy and scoping. Ms. Pye has more than 15 years experience in ecotoxicology with particular emphasis on terrestrial ecosystems and new ERA methodologies. She has worked on numerous Superfund ERAs throughout the United States, utilizing the data quality approach (DQO) approach to focus the investigations and identify most probable risk issues. She recently developed an ERA Training Guide and provided training services to the Army Corps of Engineers.

In addition to these key project team members, WCC will draw upon the expertise of technical specialists from our Natural Resource Assessment and Mitigation Practice to assist in the preparation of this ERA. WCC's Practice includes degreed experts in aquatic, marine and freshwater ecology, toxicology, and risk assessment who can be called upon if needed. Resumes of these individuals can be provided to the EPA upon request.

ECOLOGICAL RISK ASSESSMENT APPROACH

3.1 KNOWLEDGE OF REGULATORY GUIDANCE

WCC's ERA practice has evolved in parallel to Superfund requirements for baseline risk assessment. The project team proposed for this work performs risk assessments throughout the country and is familiar with most regional guidance including the most current draft guidance referred to below. The CERCLA risk assessments performed by WCC have followed ERA guidance issued by the EPA including:

- Risk Assessment Guidance for Superfund, Volume II (RAGS II). Environmental Evaluation Manual (Part A) (EPA 1989) and Eco-Updates
- Framework for Ecological Risk Assessment (EPA, 1992)
- Draft Ecological Risk Assessment Guidance for Superfund (EPA, 1994)

The ERA for the Site is being developed, and will be performed, during a period when the science of risk assessment is rapidly evolving. Portions of the Revised Work Plan, Remedial Investigation/Feasibility Study, Former Koppers Company, Inc. Newport Site, dated January 31, 1994 (Phase I RI Work Plan) were written according to "Risk Assessment Guidance for Superfund, Volume II Environmental Evaluation Manual" (EPA, 1989). The "Framework for Ecological Risk Assessment" (EPA, 1992), became available during the initial stages of the investigation and the strategy was adjusted to that guidance. A draft of a third guidance document, "Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments" (EPA, 1994), was recently made available and is being used at other sites as test cases; adjustments to the investigation based on this guidance are being considered for this Site. A perspective on how the ongoing investigation fits within the evolving guidance context is provided in Section 3.3.

3.2 ECOLOGICAL RISK INVESTIGATION PROCESS

The most effective process for conducting CERCLA ERA entails close communication and coordination between EPA and the PRP. Thus, should EPA allow Beazer and DuPont to perform the ERA for the Site, Beazer, DuPont, and WCC envision an iterative process. Such a process would be made efficient by obtaining input from EPA at various steps in the ERA rather than at the end of the process where fundamental differences in position may be realized. As such, the ERA for the Site would be performed consistent with the eight-step process described in the draft guidance as follows:

- Step 1: Preliminary Problem Formulation and Ecological Effects Evaluation
- Step 2: Preliminary Exposure Estimate and Risk Calculation
- Step 3: Problem Formulation: Assessment Endpoint Selection; Testable Hypothesis
- Step 4: Conceptual Model Development
- Step 5: Site Assessment to Confirm Ecological Sampling and Analysis Plan
- Step 6: Site Field Investigation
- Step 7: Risk Characterization
- Step 8: Risk Management

These steps will be addressed in the following section as they relate to the proposed ecological risk assessment approach for the Site.

3.3 APPROACH

When the latest draft guidance became available in September 1994, WCC began the process of integrating the concepts from the guidance into the on-going RI for the Site. Portions of Steps 1 through 4 were preliminarily addressed during preparation of the Phase II Remedial Investigation Scope of Work (Phase II RI SOW) (WCC, August 18, 1995). A discussion of the progress achieved to date and the proposed iterative approach for performing the ERA is discussed in this section.

3.3.1 Step 1: Preliminary Problem Formulation and Ecological Effects Evaluation

The objective of this step in the process is a screening level risk assessment using existing data. This initial step evaluates the following:

- Ecotoxicity literature to identify ecological risk-based benchmark values
- Spatial and temporal variations of Site-related constituents in selected exposure media to identify important fate and transport mechanisms
- Ecological community structure to identify important categories of receptor biota
- Potentially complete exposure pathways to receptors

The results and analytical data from the Phase I RI were used to perform a preliminary problem formulation and ecological effects evaluation for the Site and the findings were included in the development of the Phase II RI SOW. A more refined evaluation will be completed and presented in the draft ERA as described in Steps 3 and 4.

An acceptable method to screen the analytical data represents a critical issue to be resolved for this step. Further refinement of the ecological benchmarks will be needed to identify constituents of concern (COCs) for use in the ERA. Iterative development of the benchmarks by Beazer and DuPont, the EPA risk manager, and WCC's risk assessor is recommended prior to the selection of the relevant COCs. The proposed data screening process, benchmark values, and their source or

derivation will be presented to EPA in a meeting or submittal prior to preparation of the draft ERA.

3.3.2 Step 2: Preliminary Exposure Estimation and Risk Calculation

This effort is performed using a simple hazard quotient approach. The ecological risk-based benchmark values are compared to the maximum likely exposure levels.

The results of the preliminary exposure estimation and risk calculation based on the Phase I RI data collected at the Site supported the need to proceed to a Phase II component of the RI. The identification of both toxic and potentially bioaccumulative constituents at the Site represents a second issue to be addressed. A bioaccumulation modeling procedure and an ecological hazard quotient approach will be discussed with or provided to EPA prior to development of the draft ERA.

3.3.3 Steps 3 and 4: Problem Formulation

In Step 3, the assessment endpoints are selected and testable hypotheses are developed. In Step 4, the measurement endpoints that match each assessment endpoint are developed. The Ecological Conceptual Site Model is prepared to show the potentially complete exposure pathways.

Preliminary aspects of these two steps were used to develop the rationale and optimize the scope and approach of the field investigation during development of the Phase II RI SOW for the Site.

3.3.4 Step 5: Site Assessment for Sampling Feasibility

During this step, a field reconnaissance is performed to document whether the work plan is implementable.

Following the approval of the Phase II RI SOW, and prior to initiation of the field sampling program, a site assessment for sampling feasibility will be performed to verify that all elements of the Phase II RI SOW are implementable including availability of appropriate biota for tissue sampling analysis, reference habitats off-site, and utility of the field screening tools and techniques.

Any identified problems will be communicated to the EPA risk managers stating the needs for modifications to the Phase II RI SOW.

3.3.5 Step 6: Site Investigation

During this step the approved and verified Phase II field investigation is performed. Following the Phase II field effort and laboratory analyses, a sufficiency evaluation will be performed on the resulting data. As discussed in the Revised Phase II RI SOW (WCC, August 1995), after evaluation of the Phase II data, a Phase III RI SOW will be prepared. The Phase III RI will focus on collecting toxicity testing, benthic macroinvertebrate community and bioaccumulation and other data in support of the ERA.

3.3.6 Step 7: Risk Calculation

In this step, risk calculations are performed and the draft ERA is prepared, documenting all aspects of the stepwise process. After all phases of the RI are completed, ecological field data and the validated analytical data will be used to perform the risk calculations by integrating the exposure and effects information from all phases of the RI.

A thorough evaluation of analytical data will be performed. COCs will be identified in exposure media, including surface water, sediment, soil, groundwater, and prey tissue samples. The COCs would be selected according to the procedures previously discussed with the EPA.

An exposure characterization will be performed in which the spatial distribution of the COCs will be evaluated to identify potential exposure areas in each habitat type. The ecological conceptual Site model will be refined to identify incomplete and potentially complete exposure pathways. Reasonable Maximum Exposure levels (RMEs) will be developed for the COCs in each exposure media, and for the key receptors in each terrestrial and aquatic habitat type. Calculations based on direct contact and/or modeling of food chain bioaccumulation pathways will be performed to estimate exposure dose to prey receptors.

The risk evaluation procedures previously discussed with EPA will be used to assess the potential for ecological risk attributable to Site-related COCs. The exposure doses will be compared to 'no

observable effect level' (NOEL) ecotoxicity dose information to calculate the risks to key receptors as hazard quotients or hazard indices, as appropriate.

Field sampling results of community structure variables for both aquatic and terrestrial biota from the Site will be statistically compared to reference area data to document any significant differences that may be attributable to Site-related exposure. Benthic macroinvertebrate toxicity test results from the Site will be statistically compared to reference area data to document identifiable Site-related effects. Fish tissue concentration data from Site biota will be statistically compared to reference area biota to document differences in concentrations of Site-related constituents. Modeled bioaccumulation in wildlife will be compared to document differences in accumulation of COC's between the Site and reference areas. A weight of evidence approach will be used to interpret the risks based on the assessment endpoints.

3.4 ECOLOGICAL RISK ASSESSMENT REPORT

The results of the ERA will be communicated to the EPA risk manager in a comprehensive document that details the stepwise process described above. The ERA is a component of the RI Report but will be submitted as a separate document for EPA review and approval. The ERA document will be prepared in accordance with the "Framework for Ecological Risk Assessment" (US EPA, 1992) and the Draft Guidance (USEPA, 1994).

3.5 SUMMARY

The investigation paradigm and issue resolution strategies presented above represent a process framework for the interactive development of the ERA between the EPA risk managers, risk assessors, and Beazer and DuPont. The stepwise process with the "built in" communication points provides a flexible mechanism for discussion and redirection if necessary, and allows change to be incorporated readily. The process will foster development of a timely, cost effective and technically defensible ERA.

Tables

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TABLE 1

**RELEVANT ECOLOGICAL RISK ASSESSMENT
PROJECT EXPERIENCE SUMMARY
WOODWARD-CLYDE CONSULTANTS**

	State	Ecological Risk Assessment	CERCLA Style Risk Assessment	Ecological Assessment of Hazardous Waste Site	Terrestrial/Aquatic	EPA Region
1. Pesticide Manufacturing Site	NJ	X		X	A	II
2. Hazardous Waste Landfill	NJ		X	X	T	II
3. Pharmaceutical Research Facility	NJ			X	T	II
4. NYC Landfill ⁽²⁾	NY	X	X	X	T/A	II
5. UST Rupture	NY	X		X	T/A	II
6. Army Engine Plant ⁽¹⁾	CT	X	X	X	A	I
7. Film Manufacturer ⁽¹⁾	NY	X		X	T/A	II
8. Aluminum Reduction Plant	NY		X	X	A	II
9. Hazardous Waste Landfill	PA		X	X	T	III
10. Former Army Hospital Landfill	PA	X	X	X	T/A	III
11. Army Base	VA	X	X		A	IV
12. Pigment Plant ⁽²⁾	DE	X	X	X	T/A	III
13. Former Wood-Treating Facility ⁽¹⁾	DE		X	X	T/A	III
14. Former Pesticide Manufacturing Plant ^(1,2)	MD	X		X	T/A	III
15. Army Munitions Plant ⁽²⁾	LA	X	X		T/A	VI
16. Former WWT Plant	WA	X	X	X	T/A	X
17. Corps Artificial Island and Landfill ⁽²⁾	WA	X	X	X	A	X
18. Herbicide Manufacturing Plant ⁽¹⁾	OR	X	X	X	T/A	X
19. Metal Plating Facility	AK	X	X	X	A	X

NOTES: (1) Investigations ongoing.

(2) Abstract included in appendix.

Resumes

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LAUREL HILARIE PYE

ecological risk assessments
hazardous waste investigations
environmental impact analyses
environmental permitting
reclamation/revegetation

EDUCATION

Colorado School of Mines: Graduate Studies, Geochemistry/Geobotany/Toxicology, 1988
University of Montana: M.A., Botany (Environmental Studies), 1978
University of Colorado: B.A., Biological Sciences, 1974

PROFESSIONAL HISTORY

Woodward-Clyde Consultants, Senior Project Scientist, 1989 to date
ESE, Inc., Environmental Scientist/Technical Editor, 1986 to 1989
Colorado Department of Natural Resources, Mined Land Reclamation Division, Reclamation Specialist, 1985 to 1986
Bureau of Land Management, Uncompahgre Basin Resources, Field Botanist, 1985
Colorado Department of Wildlife, Wildlife Technician, 1981
USDA Forest Service, Region One, Biologist, 1978 to 1980
Lehigh-Northampton Counties (PA) Planning Commission, 1975-1976

REPRESENTATIVE EXPERIENCE

Ms. Pye has over 15 years of professional experience as an environmental scientist, ecotoxicologist, and botanist specializing in environmental risk assessments, environmental impact analyses, and hazardous waste investigations. During this period, Ms. Pye has managed and participated in numerous risk assessments and ecological studies for projects involving hazardous waste baseline risk assessments, industrial operations permitting, mine permitting, and reclamation planning. As a terrestrial ecotoxicologist, Ms. Pye's focus has been on assessing adverse effects from contaminant release on terrestrial wildlife and ecosystems. Ms. Pye has extensive working experience with numerous state environmental regulations and an in-depth understanding of CERCLA/SARA, RCRA, NEPA, and NRDA. Some specific, recent work accomplishments include the following:

- Project Scientist responsible for development of work plans and conduct of the terrestrial ecological risk assessment (environmental evaluation) at a smelter/mine waste Superfund site in Colorado. Project entailed extensive evaluation of toxicological information on potential adverse effects to flora and fauna (including waterfowl and raptors) from metals related exposures. Project also included development of a QA plan and Standard Operating Procedures for the biota sampling program and execution of the biota sampling program.
- Assistant Project Scientist responsible for preparation of the Ecological Risk Assessment for the proposed submerged quench incinerator at Rocky Mountain Arsenal Superfund site. Project entailed evaluation of potential impacts from modeled chemical deposition on soil.

water, and vegetation to exposed habitats and wildlife populations. Steps used to evaluate ecological risk included identifying contaminants of concern, and evaluating the release and fate of chemicals in the environment. A terrestrial and aquatic pathways analysis approach based on bioaccumulation and biomagnification was used to evaluate ecological risk to selected indicator species such as the bald eagle and American kestrel.

- Senior Project Scientist responsible for timely, successful completion of ecological risk work plans and assessments at Air Force Bases (AFBs) and facilities throughout Alaska and the western United States. Project locations include Murphy Dome LRRS (AK), Ft. Yukon LRRS (AK), Cold Bay LRRS (AK), Ft. Richardson (AK) Mountain Home AFB (ID), Dyess AFB (TX), Kure Atoll (HI) and Cannon AFB (NM). Projects have entailed quantitative assessment of potential hazards to mammals, waterfowl, raptors, and other wildlife from exposure to hazardous wastes including pesticides, PCBs, fuel oils, and metals. Projects have also entailed development of new approaches for conducting an integrated rapid assessment of potential risk from numerous solid waste management units.
- Senior Project Scientist responsible for development of U.S. Army Corps of Engineers (USACE), *Handbook for Evaluating the Ecological Risk Assessment (ERA)*. The Handbook details the ecological risk process as it relates to various phases of the Hazardous, Toxic and Radioactive Waste Site investigative process. Procedures and techniques used to perform the ERA are described in sufficient detail to allow the USACE Project and Risk Managers to evaluate the results of the ERA and decide whether or not the site poses a potential threat to the environment. A compendium of information sources on ERAs is included.
- Task Manager responsible for developing innovative risk-based approach to determining compliance with fluoride in forage regulations at a western phosphate facility. Acceptance of the risk-based approach by the State regulatory agencies brought the facility back into compliance and provided for continued operations and future facility expansion. The newly adopted permit conditions allowed the facility to replace the single, bush-based chemical concentration method of compliance with a more realistic, ecological, risk-based methodology for compliance determination.
- Senior Project Scientist responsible for design and conduct of an ecotoxicological investigation of potential lethal effects to waterfowl from exposure to water and sediments at a western U.S. gold mine tailing impoundment. Investigation included a 15-day duckling bioassay to assess the potential for acute lethal effects to waterfowl from ingestion of tailings water and sediment.

- Project Scientist responsible for ecological risk assessment at an abandoned refinery site in Montana. Project entailed qualitative assessment of potential hazards to wildlife, principally small birds and mammals.
- Task Manager responsible for quantitative ecological risk assessment on terrestrial receptors (including waterfowl and wading birds) at a large chemical facility on the Christina River, DE.
- Task Manager responsible for quantitative ecological risk assessment on terrestrial receptors (including waterfowl and wading birds) at Pelham Bay Landfill, NY.
- Project Scientist, Wild and Scenic Rivers survey of the Lehigh and Delaware Rivers, PA.
- Project Scientist responsible for development of an incremental ecological risk assessment methodology (environmental evaluation) to support a sitewide EIS (SWEIS) at a DOE facility. Effort entailed development of a methodology to determine how remediation of each of 16 operable units to specified levels will affect the cumulative level of risk to biota. As part of the SWEIS, the selected methodology will be used to analyze environmental impacts and alternatives of the current environmental restoration program.
- Task Manager responsible for environmental evaluation report as part of the baseline risk assessment of a RCRA landfill site near Minneapolis, Minnesota.
- Project Manager responsible for developing ecological risk assessment work plans to evaluate chemical and radiological hazardous waste contamination at the DOE Rocky Flats facility. Project entailed an evaluation of methodologies for performing ecotoxicological assessments of aquatic and terrestrial ecosystems across numerous operable units.
- Project Scientist and regulatory specialist responsible for identification of potential chemical-specific applicable or relevant and appropriate requirements (ARARs) as part of a DOE Superfund sitewide treatability studies program. Task involved review and understanding of federal and state regulations pertaining to surface water, groundwater, and soils. The most stringent chemical-specific ARARs identified were used to screen and evaluate remediation technologies.
- Assistant Project Scientist responsible for development of a revegetation plan for a 300-mile pipeline route through the Mojave Desert and San Joaquin Valley. Project included development of site-specific procedures for protection of endangered and sensitive plant species and selection of revegetation and seeding prescriptions for the pipeline route.

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PUBLICATIONS

Carlson, C.; Dooling, O.; and Pye, L. Fluoride Concentrations in Vegetation near Columbia Falls, Montana. USDA Forest Service Publication. Region One. Missoula, MT. 1980.

Dooling, O. and Pye, L. Assessment of Mistletoe Infection on Lolo and Bitterroot National Forests. USDA Forest Service Publication. Region One. Missoula, Montana. 1980.

Lytle, T. and Pye, L. Colorado Greater Sandhill Crane Census. Colorado Division of Wildlife Publication. Grand Junction, Colorado. 1981.

Pye, L. Impact of SO₂ on Mycorrhizal Populations of Agropyron smithii Rydb. in Southeastern Montana. Univ. of Montana. Missoula, Montana. M.A. Thesis. 1978.

Pye, L., J. Williams, and J.S. Heath. 1994. Applying Ecological Risk Assessment to the Agricultural Industry: A Case History. American Institute of Chemical Engineers, Proceedings from July 1994 meeting in Denver, Colorado.

Rice, P.M.; Pye, L.; Boldi, R.; O'Loughlin, J.; Tourangeau, P.; and Gordon, C. "The Effects of Low Level SO₂ Exposure on Sulphur Accumulation and Various Plant Life Responses on Some Major Grassland Species on the Zonal Air Pollution Plots (ZAPS)," pp. 100-197, and "An Evaluation of the Nature of SO₂ Monitoring," pp. 248-260. The Bioenvironmental Impact of a Coal-Fired Power Plant. USEPA Fourth Interim Report. 1978.

Rice, P.M.; Gordon, C.; Tourangeau, P.; and Pye, L. "Mycorrhizal Association and Root Characteristics in Western Wheatgrass Fumigated with Sulphur Dioxide." The Bioenvironmental Impact of a Coal-Fired Power Plant. USEPA Fifth Interim Report. 1979.

CITED IN:

Guillame, M.; Berg, W.; and Herron, J.T. Performance of Native and Introduced Species Seven Years after Seeding in the Alpine. Proceedings of the High Altitude Workshop. 1979.

Berg, W.; Guillame, M.; and Herron, J.T. Effect of Fertility Treatment and Mulches on Revegetation in the Colorado Alpine. Proceedings of the High Altitude Workshop. 1986.

AFFILIATIONS

National Association of Environmental Professionals
Sigma Xi
SETAC

LAUREL HILARIE PYE

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RECENT PRESENTATIONS:

Dawson, J. and L. Pye. 1994. Analysis of Plant Communities at California Gulch Site, Leadville, California. Poster Presentation at 15th Annual Meeting of Society of Environmental Toxicology and Chemistry in Denver, Colorado, November 1994.

Pye, L.H. and J.S. Heath. 1994. Applying Ecological Risk Assessment to the Agri-Chemical Industry: A Case History. Poster Presentation at 15th Annual Meeting of Society of Environmental Toxicology and Chemistry in Denver, Colorado, November 1994.

Pye, L.H., R.D. Beane, and J.L. Dawson. 1994. Terrestrial Ecosystem Evaluation at California Gulch Site, Leadville, Colorado. Poster Presentation at 15th Annual Meeting of Society of Environmental Toxicology and Chemistry in Denver, Colorado, November 1994.

Appling, J.W. and L.H. Pye. 1994. Obtaining Realistic Exposure Estimates Around Hot Spots Using Probabilistic Uncertainty Analysis: An Elk Foraging Model. Platform Session at 15th Annual Meeting of Society of Environmental Toxicology and Chemistry in Denver, Colorado, November 1994.

Pye, L. 1993. Decision Analysis/Risk Analysis (DARA) Methodology for Evaluating Ecological Risk at Federal Facilities. Poster Presentation at 14th Annual Meeting of Society of Environmental Toxicology and Chemistry in Houston, Texas, November 1993.

Pye, L. 1993. Ten-Step Plan for Conducting Ecological Risk Assessment. Poster Presentation at 14th Annual Meeting of Society of Environmental Toxicology and Chemistry in Houston, Texas, November 1993.

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Woodward-Clyde Consultants

EDWARD W. ODENKIRCHEN

risk assessment
data validation
wetland delineation
expert testimony

EDUCATION

George Mason University, Ph.D. (candidate, dissertation in progress), Environmental
Biology/Public Policy

American University: M.A., Environmental Toxicology, 1987

Oglethorpe University, B.S., Biology, 1982

PROFESSIONAL HISTORY

Woodward-Clyde Federal Services, Assistant Project Scientist, 1994-present

ENVIRON Corporation, Senior Associate, 1992-1994

Food and Drug Administration, Center for Food Safety and Applied Nutrition, Environmental
Impact Section, Biologist, 1991-1992

Dynamac Corporation, Staff Scientist, 1987-1991

American University, Research Intern, 1985-1987

IGEN, Incorporated, Research Associate, 1985-1987

Metpath Incorporated/Bionetics, Senior Technologist, 1982-1985

REPRESENTATIVE EXPERIENCE

Mr. Odenkirchen has over 8 years of experience in the assessment of ecological risks of chemical compounds. Extensive experience in ecotoxicological hazard and risk assessments for TSCA, NEPA, and Superfund applications. Experienced in the use of wildlife and aquatic toxicity data, chemical analogues, and structure-activity relationships for predicting the potential ecological hazards of new and existing chemicals. Demonstrated abilities in auditing and data validation for ecological testing programs. Experience in presenting scientific and policy-related positions before members of Congress, state and Federal regulatory authorities, and citizen's groups.

In addition, Mr. Odenkirchen has 5 years of experience in research and reference laboratories developing new methodologies to detect air- and waterborne toxic compounds and pathogens. These included development of biomarker assay systems for the field detection of chemical warfare agents, enterotoxins, mycotoxins, and pathogenic bacteria species. Methods development included new technologies to replace presumptive water quality tests, and the development of a new technology (proprietary in scope) to detect individual chemical agents at picomolar concentrations. Reference laboratory work included the diagnostic evaluation of tissue and other biological samples for the presence of various physiological markers, pathogenic organisms, immunologic components, neuroleptic receptors, and compounds of forensic toxicological interest.

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Examples of Mr. Odenkirchen's experience include:

- Manager of an ecological risk assessment project for an Ohio Superfund site. The project involved the contamination of a watershed with mirex and kepone. Portions of the receiving waters are included in the National Wild and Scenic River Program. The risk assessment included an evaluation of food chain transfer of the contaminants to piscivorous birds and mammals as well as terrestrial inhabitants of the riparian zone. A program to evaluate the watershed's habitat suitability for and contaminant-related effects in the endangered Indiana bat, *Myotis sodalis* was implemented.
- Manager of an ecological risk assessment project for a Pennsylvania Superfund site. This project concerned the contamination of a nationally significant limestone coldwater fishery and surrounding uplands with mirex and kepone. The project included evaluation of the extent of water, sediment, and fish contamination. Risks to piscivorous birds and mammals as well as upland organisms were assessed.
- Technical consultant for a project evaluating the ecological risks associated with volatile, semivolatile, and metal contamination of wetlands and uplands of a New Jersey Pine Barrens system associated with a Superfund site. Survey data on habitats and resident species were used to establish candidate indicator species. Indicator species status was prioritized using a sensitivity parameter matrix. Exposures to all selected indicator species were modeled from media contamination data and were compared to regulatory or toxicologically derived effects thresholds.
- Manager of a project to develop an ecological risk-based strategy for establishing sediment removal priorities in contaminated zones of the Grand Calumet River in Indiana. This project involved: (1) deriving sediment quality criteria for polynuclear aromatic hydrocarbons and other organics based on the USEPA proposed criteria approach; (2) evaluating the suitability of pore-water and acid volatile sulfide approaches for developing sediment criteria for toxic metals; and (3) developing an aggregate risk-based paradigm for prioritizing sediment transects and horizons with regard to maximizing reductions in risks to aquatic and benthic organisms within the context of limited sediment removal operations.
- Technical manager of a NEPA project to evaluate the potential impacts of operation of a cogeneration electrical power plant on the biodiversity of a watershed in southern Pennsylvania.
- Work assignment manager for USEPA Office of Water Regulations and Standards (OWRS) project which involved the collection, entry, maintenance, and technical summary of national fish kill data. Work assignment manager for USEPA OWRS Technical Document Clearinghouse; task involved acting as a liaison for USEPA and

EDWARD W. ODENKIRCHEN

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state, local, and private sector personnel for the distribution of technical guidance information concerning water quality issues. Work assignment manager for USEPA OWRS project to analyze outfalls of publicly owned treatment facilities for the presence of diazinon.

- Task manager for USEPA National Estuary Program mapping project for the development of a series of digitized maps of protected fish and wildlife habitats, public land use, commercially exploited resources, wetlands, natural shores, and submerged aquatic vegetation for the New York Bight area.
- Provided technical and programmatic critique of State Nonpoint Management Programs for USEPA OWRS. Task manager for a review of Clean Water Act section 319 Nonpoint Source Pollution Grants which included the evaluation of attainment of projected goals, disbursement of funds, and indicators of future pollution control efforts. This analysis was used by USEPA in a report before Congress regarding progress toward nonpoint source pollution reductions.
- Performed aquatic toxicology laboratory audits, data validations, and assessments of additional testing efforts in support of testing initiatives for USEPA OWRS Water Quality Advisory projects.
- Technical manager of a project to evaluate the ecological risks associated with consumer use of commercial dyestuffs. This project involved: (1) the assembly of data on the physical, chemical, and toxicological properties of 35 dyestuff compounds; (2) development of suitable exposure models for consumer release to wastewater systems and efficiency of wastewater treatment of dyes; and (3) a comparison of end-pipe emissions of residual dyes to receiving waters with toxicity thresholds. Other environmental issues addressed included dyestuff impacts on municipal solid waste management and attainment of municipal wastewater treatment goals.
- Technical manager of a project to evaluate the ecological impact of the use of polyvinyl alcohol polymer products disposed to wastewater treatment facilities. This project evaluated the risks to aquatic and terrestrial organisms as a result of the commercial use of polyvinyl alcohol polymers in consumer products and included evaluations of the treatability, residual wastewater loads, toxicity, and ultimate environmental fate of the polymers and their metabolites.
- Author of a comprehensive risk assessment for the potential ecological impacts associated with the accidental release of arsenic to the marine environment of the New York Bight. The project included assessing impacts to finfish/shellfish resources, endangered species impacts (sea turtles and marine mammals), and comparative risk reductions associated with controlled release and salvage remediations.

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- Author of a technical evaluation of the USEPA and Kentucky proposals for the development of site-specific ambient water quality criteria for metals (i.e., water effects ratio approach, dissolved metals, and whole effluent toxicity monitoring).
- Author of a technical evaluation of the Virginia and Kentucky use of regulatory bioconcentration factors for 2,3,7,8-TCDD and other dioxins and furans in establishing health-based and wildlife-based water quality criteria.
- Author of a report on the potential natural resources damages associated with a large petroleum spill in the Anacostia River watershed which included assessments of fisheries damages, impacts to aquatic organism breeding grounds, and waterfowl staging areas.
- Developed a program of investigation for the use of extracted metal to acid volatile sulfide ratios as a predictor of the ecological impacts of divalent metal sediment contamination at a Superfund site in New York.
- Developed and implemented a comprehensive field investigation program for determining the habitat types and biotic communities associated with contaminant-impacted areas surrounding a New York aluminum smelting facility.
- Performed wetland delineations in Texas and New Jersey, and developed a wetlands mitigations plan and analysis of wetland functionality goals for a wetlands mitigation project in New Jersey.
- Provided technical review for EPA of site-specific ecological risk assessments submitted to USEPA Regions III and IV for Superfund projects. This included the evaluation of the adequacy of environmental/biological sampling programs and the scientific basis for determinations of biota exposure and hazards. Designed a benthic macroinvertebrate sampling program for the Tom's River Ciba-Geigy Superfund site in support of post-remediation progress monitoring. Developed a series of aquatic ecological investigations to establish baseline impacts to the Chattanooga Creek, Tennessee watershed associated with PAH and metals contamination.

EDWARD W. ODENKIRCHEN

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AWARDS

- 1992: Certificate of Commendation by the Commissioner of the Food and Drug Administration for the development of regulatory criteria for the review of biotechnologically-derived foods,
- 1982: Omicron Delta Kappa - National leadership and service honorary
- 1982: Recipient of the James Edward Oglethorpe Award for academic excellence

AFFILIATIONS

American Institute for Biological Sciences
Society of Environmental Toxicology and Chemistry

PRESENTATIONS

Testimony before the Virginia Department of Game and Inland Fisheries regarding the ecological risk-based requirements for the sampling and monitoring of wildlife resources for dioxin contamination: Richmond, VA; December, 1992.

Testimony before the United States Coast Guard, and Washington DC citizens' groups regarding the potential ecological consequences of a large fuel oil spill in the Anacostia River: Washington, DC; February, 1992.

Testimony before Senator J. Rockefeller (D-WV) regarding potential environmental impacts of the use of chromate copper arsenicals (CCA) in wood preservation facilities: Charles Town, West Virginia; May 3, 1988.

Testimony before the West Virginia Department of Natural Resources regarding the potential environmental impacts of CCA wood preservatives: Charleston, West Virginia; December 12, 1988.

PUBLICATIONS

Odenkirchen, E.W. and R. Eisler. 1988. Chlorpyrifos hazards to fish, wildlife, and invertebrates: a synoptic review. U.S. Fish Wildl. Serv. Biol. Rep. 85(1.13). 34 pp.

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GOVERNMENT DOCUMENTS

Principal Author

1987

Prepared 10 Ecotoxicology Hazard Reviews for 10 chemicals submitted under the TSCA PMN/New Chemicals Program. Reports, which fall under Confidential Business Information (CBI) security restrictions, covering the use of analogues, QSAR, and actual test data for predictions of ecotoxicological hazards to fish, invertebrates, and aquatic plants.

Prepared 9 Technical Summaries of Health and Environmental Risk Assessment Meetings held by the Office of Toxic Substances (OTS) for review of genetically manipulated organism PMNs.

1988

Prepared 11 Ecotoxicology Hazard Reviews for 11 new chemicals (TSCA PMN/New Chemicals Program).

Prepared 9 Technical Summaries of Health and Environmental Risk Assessment Meetings held by OTS staff for review of genetically manipulated organism PMNs.

1989

Prepared 3 Ecotoxicology Hazard Reviews for 3 new chemicals prior to manufacture or import (TSCA PMN/New Chemicals Program).

Prepared 4 Technical Summaries of Health and Environmental Risk Assessment Meetings held by OTS staff for review of genetically manipulated organism PMNs.

Prepared 18 New Chemical Analogue Profiles. Reports included critical review of the toxicological data on analogue chemicals and its suitability for predicting toxicological hazards of new chemicals (TSCA PMN). USEPA/OTS/Chemical Review and Evaluation Branch.

Generic Environmental Hazard Assessment of Hydrazines and Related Compounds. USEPA/OTS/Health and Environmental Review Division.

Approaches for Bioconcentration Factor Determination: A Position Paper. USEPA/ECAO.

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Fish Kills Caused by Pollution 1977-1987: A summary and analysis of national fish kill data. USEPA/OWRS.

Prepared 2 Field Test Protocol Reviews for 2 sets of genetically manipulated microorganisms submitted to OTS for field efficacy research (TSCA/PMN). Reports included evaluation of the experimental design of the research projects.

1990

A Benthic Macroinvertebrate Monitoring Strategy for Monitoring the Effectiveness of Remedial Activities at the Tom's River, New Jersey Waste Site. USEPA Region 2.

A Strategy for Sediment Sampling and Ecological Monitoring of Chattanooga Creek, Tennessee. USEPA Region 4.

1991

Technical Approach for the Evaluation of the Ecological Effects of Polycationic Polymer Food Additives. FDA/Center for Food Safety and Applied Nutrition/Environmental Impact Section.

Environmental Assessment for Proposed FDA Regulation of Lead in Wine Foils. FDA/CFSAN/EIS.

Environmental Assessment for Proposed FDA Regulation of Lead in Ceramicware. FDA/CFSAN/EIS.

Environmental Assessment for Proposed FDA De-Listing of the Use of Pentachlorophenol in Paper Food Packaging. FDA/CFSAN/EIS.

Scientific Points to Consider for the Environmental Assessment of Proposed Commercial Use of Biotechnologically-Derived Plants. FDA/CFSAN/EIS.

Contributing Author

1987

Toxicological Profile. Benzene. ATSDR/USEPA.

Toxicological Profile. Heptachlor/Heptachlor Epoxide. ATSDR/USEPA.

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African Locust Control Testing Project Field Investigation Plan. U.S. Agency for International Development.

1988

Generic Environmental Hazard Assessment of Cationic Dyes with Localized and Delocalized Positive Charges. USEPA/OTS.

Pesticide Hazard Assessment Report. Final Report of the African Locust Testing Program. USAID.

1989

Generic Environmental Hazard Assessment of Dithiocarbamates and Their Degradation Products. USEPA/OTS.

Oversight Review of Risk Assessment Prepared for the Ciba-Geigy, McIntosh, Alabama Waste Site. USEPA Region 4.

Understanding Risk and the Citizen's Role in Superfund. USEPA/OSW.

1990

A National Overview of Ecological Risks (Species and System Levels) Associated with Pesticide Use. USEPA/OPPE.

National Trends for Significant Terrestrial Habitats. USEPA/OFA.

Woodward-Clyde Consultants

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ecological risk assessment
environmental assessment
aquatic ecology

EDUCATION

Rutgers University: M.S., Zoology, 1981

Monmouth College: B.S., Biology, 1976

CERTIFICATIONS/TECHNICAL TRAINING

Certified Senior Ecologist, Ecological Society of America

Professional Association of Diving Instructors

Hazardous Waste Training (OSHA CFR 29:1910:120)

Basic Wetland Delineation Training Course

WCC Ecological Risk Assessment Workshop

PROFESSIONAL HISTORY

Woodward-Clyde Consultants, Senior Project Scientist, 1981-present

Pandullo Quirk Associates, Senior Environmental Scientist, 1979-1981

Water Resources Research Institute, Field Technician, 1978

Pandullo Quirk Associates, Benthic Ecological Task Leader, 1976-1977

National Marine Fisheries Service, Biological Aid, 1974-1976

REPRESENTATIVE EXPERIENCE

Ms. Mancini is the Task Leader of the Natural Resources Group in WCC's Plymouth Meeting office. She is also a Practice Leader on WCC's Natural Resource Damage Assessment Steering Committee.

Ms. Mancini has served as research and report coordinator, environmental task leader and project manager for a variety of environmental studies, including regional and site-specific inventories of natural resources, hazardous and non-hazardous site evaluations and assessments, and site selection studies associated with landfills and other commercial and industrial uses. Areas of study span the continental U.S. and Alaska.

Ms. Mancini has provided technical expertise and served as task leader on numerous ecological risk assessments, and is familiar with the most current EPA Superfund and RCRA guidance. She has served as ecological task leader on several comprehensive RI/FS investigations. She has prepared detailed Ecological Data Collection Plans for a wide variety of sites with complex ecosystems. She has also contributed ecological expertise in the preparation of Feasibility Studies, Alternatives Analyses and Ecological Monitoring Plans.

Ms. Mancini's specialized area of expertise is benthic ecology. She has designed and conducted benthic investigations in freshwater, estuarine and marine ecosystems throughout the United States. Many of these investigations have focused on the use of benthic macroinvertebrates in the assessment of ecological impacts associated with hazardous waste sites.

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Examples of Ms. Mancini's project-related experience are summarized below.

Ecological Risk Assessment Experience:

- Acting peer reviewer for several comprehensive ecological investigations at SUPERFUND sites in Oregon and Washington
- Co-Investigator for an ecological risk assessment performed for a former sewage treatment facility on the Sammamish River in Redmond, Washington.
- Principle investigator for an ecological risk assessment being performed as part of the remedial investigation of a wood treatment site in Renton, Washington.
- Task leader for ecological risk assessment at a chromium etching facility on a US Army installation near Shreveport, LA.
- Task leader for ecological risk assessment of a former army hospital in Pennsylvania.
- Scoping and peer reviewer of aquatic ecological risk assessment of a CERCLA site near Denver, Colorado.
- Task leader for New York State Fish and Wildlife Impact Assessment performed at an industrial site in Blauvelt, New York.
- Ecological Risk Assessment of a United States Army Toxic and Hazardous Materials Agency (USATHAMA) site, targeted for closure and sale, in Annandale, Virginia.
- Ecological Risk Assessment of a pigment plant located in Delaware; CERCLA site.
- Preliminary Endangerment Assessment and Aquatic Environmental Assessment in the vicinity of a former pesticide plant in central New Jersey.
- Endangerment assessment for abandoned auto salvage landfill site in Pensacola, Florida.
- Assessment of impacts to the aquatic fauna in the vicinity of a former waste dump in Port Arthur, Texas.

RI/FS Experience:

- Preparation of portions of a work plan dealing with ecological sampling at a former wood-treating facility in Delaware; CERCLA site.

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- Preparation of Ecological Data Collection Plan involving sampling of fish, benthos, sediment and aquatic macrophytes, and subsequent evaluation of data at the site of an aluminum reduction plant in New York; CERCLA site.
- Endangerment assessment for a coal tar site in Long Branch, New Jersey.
- Endangerment assessment for a former industrial landfill in Niagara Falls, New York.
- Endangerment assessment for abandoned auto salvage landfill site in Pensacola, Florida.
- Evaluation and hazard ranking using the USEPA Hazard Ranking System of 40 waste sites in New York State (NYDEC Regions 1, 2, and 3).
- Risk assessment study for a major hazardous waste transfer and incineration facility on the Atlantic Coast.
- Assessment of impacts to the aquatic fauna in the vicinity of a train derailment release of perchloroethylene in Livingston, Louisiana.
- Assessment of impacts to the aquatic fauna in the vicinity of a former waste dump in Port Arthur, Texas.

Environmental Assessment Experience:

- Preparation of an Environmental Assessment Report for a proposed industrial waste landfill in Delaware City, Delaware.
- Baseline inventory and impact assessment associated with roadway improvements along the Garden State Parkway.
- Baseline inventory and management recommendations for environmental resources at the Eleanor Roosevelt National Historic site in Hyde Park, New York.
- Baseline inventory and management recommendations for environmental resources at the Willowbrook Developmental Center in Staten Island, New York.
- Baseline inventory and impact assessment for the Manasquan Reservoir System in Monmouth and Ocean Counties, New Jersey.
- Environmental assessment of the effects of a zinc smelter plant in Palmerton, Pennsylvania.
- Environmental assessment of the siting of regional wastewater treatment facilities in Cape May and Camden Counties, New Jersey.

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Site Selection Experience:

- Critical review of site selection methodology and supporting documentation for a landfill site selection study performed in central New Jersey.
- County-wide site selection study for an interim/residue landfill site in Somerset County, New Jersey.
- Regional wastewater treatment facilities in Cape May and Camden Counties, New Jersey.
- County-wide sanitary landfill, transfer station and composting facilities in Cape May County, New Jersey.
- Potential sites for land application of wastewater effluent in Camden County, New Jersey.
- Summit General Mail Facility in Morris County, New Jersey.

Aquatic Ecological Experience:

- Benthic macroinvertebrate community survey in Eastchester Bay, New York.
- Benthic survey and impact assessment of an unnamed stream in Blauvelt, NY.
- Impact assessment for ocean dumping in the New York Bight Apex.
- Ecosystem evaluations for Sandy Hook Bay, Raritan Bay, New York Bay, and Long Island Sound.
- Impact assessment for Suffolk County Stream Flow Augmentation Study in Long Island, New York.
- Ecological studies to support an EIS for I-95 roadway improvements in Bucks County, Pennsylvania.
- Impact evaluation of causeway construction on migration of larval fish in Prudhoe Bay, Alaska.
- Impact evaluation of flood control measures on Halls and Green Bayous in Harris County, Texas.
- Determination of the historical mean high water mark on a natural lake in Polk County, Florida.
- Baseline inventory and assessment of aquatic impacts due to the filling of a portion of the East River below FDR Drive in Manhattan.

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- Baseline inventory and impact assessment due to ocean disposal of wastewater effluent in Cape May County, New Jersey.
- Assessment of aquatic impacts due to phosphate mining in Pamlico Bay, North Carolina.
- Baseline inventory of aquatic ecosystems in the vicinity of a proposed copper mine in Aroostook County, Maine.

Wetlands Investigations:

- Evaluation of wetlands which developed as a result of remediation of a landfill in Lehigh County, PA; CERCLA site.
- Determination of the potential for wetlands to exist at an abandoned herbicide site in Elkton, Maryland.
- Preliminary reconnaissance for the purpose of identifying wetlands on a former ash residue disposal site along the Delaware River in Holland Township, New Jersey.
- Preparation and submittal of an NJDEP Wetlands and Stream Encroachment Permit package for the remediation of contaminated ditches at an abandoned pesticide manufacturing facility in Middlesex, New Jersey.
- Verification of wetland boundary lines for a proposed ash residue landfill site in central New Jersey.
- Determination of the potential for wetlands to exist on the site of a proposed regional mall in Harrisburg, Pennsylvania.
- Verification of wetland boundary lines for a commercial tract on the Arthur Kill in Perth Amboy, New Jersey.
- Investigations associated with permit acquisition for filling in freshwater wetlands at a 250-acre site in Wilmington, Delaware.

AFFILIATIONS

North American Benthological Society
Association of New Jersey Environmental Commissions

Abstracts

AR309050

PROJECT:	Ecological Risk Assessment at a Former Pesticide Formulation Plant (RCRA)
LOCATION:	EPA Region III
CLIENT:	Confidential
PERFORMANCE PERIOD:	1993 to present

WCC is currently performing an ecological risk assessment of site related contaminants which pose a threat to terrestrial ecological resources on or in the vicinity of a former pesticide formulation plant. The assessment is being performed as part of a RCRA Corrective Action for the site.

The primary habitat at the site is mature forest. DDT and its metabolites are the chemicals of concern. Key receptors include small mammals and birds which utilize the site.

The project strategy is to perform a Corrective Measures Study which will define the most appropriate remedial alternative. Ecological risk will be assessed based on the residual contamination.

PROJECT: Ecological Risk Assessment for the
Hamilton Island Landfill

CLIENT: United States Army Corp of Engineers

LOCATION: Oregon

PERFORMANCE PERIOD: November 1993 to April 1994

A "CERCLA-Style" ecological risk assessment was performed to evaluate potential risks to ecological receptors due to exposure to landfill-related chemicals in soil, sediment, surface water, seepage water and groundwater. Of particular concern was the potential for impacts to the indigenous biota in the Columbia River Gorge Natural Area. Primary potential receptors include bald eagle, peregrine falcon, spawning populations of anadromous salmon and trout, and a resident population of white sturgeon.

Extensive field sampling and analysis of all exposure media for TAL Metals, TCL Volatiles/Semi-Volatiles, PCB and Pesticides were performed. Concentrations of detected chemicals were compared to toxicity-based ecological benchmarks to identify chemicals of concern. USEPA water quality criteria and toxicity-based lowest observed effects levels were used to screen the surface water, groundwater, and seepage water data. Soil data were compared to local and regional background reference values and to risk based soil cleanup guidelines. Sediment data were compared to risk-based synoptic benchmark values derived from federal and state guidelines and sediment toxicity data. Water data were also compared to wildlife drinking water benchmarks derived from literature toxicity data, the State of Washington Model Toxics Control Act Groundwater Regulations, and USEPA MCL Values.

Based on the rigorous screening of all available data, no chemicals of concern were identified for any exposure media or pathways leading to receptor organisms. A few minor exceedances of the ecological benchmarks were observed, but their occurrence was explained as sampling and/or laboratory artifacts. A few areas with elevated levels of landfilled chemicals were identified in deep soil borings that receptors would not be exposed to. No evidence of these chemicals was detected in groundwater. In general, the landfill does not represent a threat to ecological receptors.

PROJECT: Ecological Risk Assessment for Pelham Bay Landfill

CLIENT: New York City Dept. of Environmental Protection

LOCATION: New York City

PERFORMANCE PERIOD: 1991 to 1993

Pelham Bay Landfill is located in the Eastchester Bay in EPA Region II, New York City. Woodward Clyde Consultants was retained to perform an ecological risk assessment of the potential risks to biota in the terrestrial and estuarine ecosystems on and directly adjacent to the landfill. The evaluation followed the Risk Assessment Guidance for Superfund, Volume II (RAGS II), Environmental Evaluation Manual (Part A) (USEPA 1989) and the Framework for Ecological Risk Assessment (USEPA 1992). It was intended to provide a predictive screening of potential baseline risks to receptors of concern.

The terrestrial ecosystem evaluation was based on surface soil chemical analyses to determine whether existing concentrations of chemicals of concern posed a risk to wildlife. The evaluation showed that six of the nine chemicals of concern did not pose a risk. For the aquatic system, the media of exposure for most of the biota was surface water and sediments. A variety of metals and PCBs were present in surface water and sediments which could pose a potential threat to shellfish, finfish and estuarine birds.

PROJECT: Ecological Risk Assessment for the Y-Line Chromium Etching Facility,
Louisiana Army Ammunition Plant

CLIENT: Army Environmental Center
Department of the Army

DATE: 1993 to 1995

A "CERCLA-style" ecological risk assessment was conducted to determine potential risks to terrestrial and aquatic receptors in the vicinity of the chromium-etching facility. Data collected included surface water, sediment, ground water, soils and benthic community analyses. Aluminum was the only chemical of concern for surface water; none were identified for groundwater or sediments. While several metals were identified as soil chemicals of concern, elevated concentrations were only measured in a highly disturbed and developed portion of the site.

PROJECT:	Ecological Investigations and Environmental Evaluation of a (CERCLA) Pigment Manufacturing Plant
LOCATION:	EPA Region III
CLIENT:	Confidential
PERFORMANCE PERIOD:	1988 to 1994

WCC performed wetland and river investigations as part of CERCLA RI/FS work for a pigment manufacturing plant located on a tidal river in the Delaware Estuary. The site includes two landfills located in and adjacent to tidal wetlands where a variety of hazardous and non-hazardous materials were disposed over the last several decades. WCC collected existing available data and additional site specific environmental data including surface water and sediment chemistry, elutriate toxicity testing using water flea and fathead minnow, solid phase toxicity testing using amphipod and midge larvae, benthic community analyses, fish tissue analyses, fish population data and vegetation tissue analyses.

WCC used data collected as input into an Ecological Risk Assessment for the site in accordance with the USEPA Risk Assessment Guidance Document Volume II. Since metals were the constituents of concern, sediments were the primary exposure medium.

The "weight of evidence" approach was used in the aquatic scenarios to demonstrate which river and wetland areas represented the greatest risk.

Another tool used in the evaluation to assess sediment quality was the Sediment Quality Triad Approach. The Sediment Quality Triad Approach utilizes concurrent measurement of sediment chemistry, toxicity testing and benthic macroinvertebrate data to determine the extent of impact in the site vicinity relative to a non-impacted reference station. WCC successfully used this approach to identify portions of the system which are influenced by site activities.